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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,555	06/29/2005	Clemens Backhaus	740116-556	2739

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EXAMINER	
GREENE, JASON M	

ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
03/03/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/519,555	BACKHAUS ET AL.	
	Examiner	Art Unit	
	Jason M. Greene	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *29-68* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *29-68* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/13/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims

1. With regard to claim 29, the Examiner suggests Applicants rewrite "to1" in line 11 as "to 1" to correct an apparent typographical error.

2. With regard to claim 31, the Examiner suggests Applicants insert a period (.) at the end of line 2 to correct a minor grammatical informality.

3. With regard to claim 36, the Examiner suggests Applicants delete the word "and" at the end of line 2 and insert a period (.) in place thereof to correct an apparent typographical error.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 67 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 67 recites the limitation "the at least one pressure compressor" in line 2. There is insufficient antecedent basis for this limitation in the claim. It appears as though claim 67 was intended to depend from claim 63 instead of claim 62, and such has been assumed for the purposes of examination. If this assumption is correct, Applicants should make the appropriate correction in claim dependency.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 29, 31, 33, 35, 36, 38, 40, 41 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Yee et al. (US 5,447,555).

Yee et al. discloses a membrane separation process for the enrichment of at least one gas component in a gas flow (101) using a membrane separation device (113) which is part of a membrane separation unit and has at least one membrane (115) for separation of the gas flow into a retentate (125), which is discharged on a retentate side

of the at least one membrane, and a permeate (117), which is discharged on a permeate side of the at least one membrane, comprising the steps of compressing (using compressor 103) the gas flow to an inlet pressure higher than ambient pressure before passing the gas flow through the membrane separation unit and lowering the pressure (using a vacuum pump) of the permeate side of the at least one membrane as compared with the inlet pressure, and delivering the gas flow to the membrane separation unit under an absolute pressure of 24.7 psia (1.7 bar) (see Ex. 1) and discharging the permeate from the membrane at an absolute pressure of 14.7 psia (1.0 bar), wherein the pressure drop on the retentate side of the at least one membrane is negligible and the retentate is discharged at an absolute pressure of about 1.7 bar, wherein the pressure of the retentate is changed by an amount corresponding to the size of the pressure drop occurring on the retentate side of the membrane separation unit, wherein the process is performed in a single stage or wherein the flow is divided in at least two streams and split through at least one of a plurality of different parallel membrane separation devices and membrane separation units installed in a membrane separation system (see especially col. 3, line 59 to col. 4, line 34), wherein the pressure wherein the gas component to be enriched is passed through the membrane into the permeate, wherein the membrane separation device comprises at least a plate module, and wherein the pressure of the inlet pressure of the gas flow, the outlet pressure of the retentate and the outlet pressure of the permeate are changed in a single stage in Figs. 1-5 and col. 3, line 59 to col. 11, line 23.

8. Claims 29, 31, 33, 35, 36, 38-40, 43, 45 and 46 are rejected under 35 U.S.C. 102(e) as being anticipated by Nelson et al. (US 6,540,813 B2).

Nelson et al. discloses a membrane separation process for the enrichment of at least one gas component in a gas flow using a membrane separation device (30) which is part of a membrane separation unit and has at least one membrane (10) for separation of the gas flow into a retentate, which is discharged on a retentate side of the at least one membrane, and a permeate, which is discharged on a permeate side of the at least one membrane, comprising the steps of compressing the gas flow to an inlet pressure higher than ambient pressure before passing the gas flow through the membrane separation unit and lowering the pressure (using a vacuum pump) of the permeate side of the at least one membrane as compared with the inlet pressure, and delivering the gas flow to the membrane separation unit under an absolute pressure of 2.15 bar (115 kPa or 1.15 bar gauge) (see Ex. 13) and discharging the permeate from the membrane at an absolute pressure of 0.81 bar (1 bar atmospheric – 19 kPa (0.19 bar) vacuum), wherein the pressure drop on the retentate side of the at least one membrane is 5 kPa (0.05 bar) and the retentate is discharged at an absolute pressure of about 2.1 bar, wherein the pressure of the retentate is changed by an amount corresponding to the size of the pressure drop occurring on the retentate side of the membrane separation unit, wherein the process is performed in a single stage, wherein the pressure wherein the gas component to be enriched is passed through the membrane into the permeate, wherein the permeate is enriched in oxygen, and the is enriched to a concentration of 32 vol.%, and wherein the membrane separation device

comprises at least one of a plate module and a hollow fiber module, wherein the temperature of the gas flow is increased by about 25 ^{0}C from ambient to 50 ^{0}C before entering the membrane separation unit, wherein the separation of the gas in the membrane separation unit is performed at ambient temperature, and wherein the pressure of the inlet pressure of the gas flow, the outlet pressure of the retentate and the outlet pressure of the permeate are changed in the single stage in Figs. 1-5 and col. 4, line 24 to col. 14, line 30.

9. Claims 47-55, 57, 58, 60 and 61 are rejected under 35 U.S.C. 102(b) as being anticipated by Blackmer et al. (US 3,976,451).

Blackmer et al. discloses a membrane separation process for the enrichment of at least one gas component in a gas flow using a membrane separation device (10) which is part of a membrane separation unit and has at least one membrane (60) for separation of the gas flow into a retentate, which is discharged on a retentate side of the at least one membrane, and a permeate, which is discharged on a permeate side of the at least one membrane, comprising the steps of delivering the gas flow to the membrane separation unit at ambient pressure, the retentate being discharged from the membrane separation unit at an outlet pressure that has been lowered below ambient pressure, and the pressure on the permeate side being lowered (using vacuum pump 38) relative to the outlet pressure of the retentate, wherein the outlet pressure of the retentate is changed by an amount corresponding to the size of the pressure drop occurring on the retentate side of the membrane separation unit, wherein the volume of

the permeate and the concentration of the component of the gas flow that is enriched are controlled by lowering the pressure level on the permeate side, wherein the process is performed in a single stage, wherein a pressure difference between the gas flow and the retentate is less than 1 bar and is controlled depending on the concentration of the component enriched in the permeate (since the flow rate (and hence pressure drop) on the retentate side of the membrane and the concentration of the enriched component in the permeate are dependent on the level of vacuum on the permeate side), wherein the gas component to be enriched is passed through the membrane into the permeate, wherein the permeate is enriched in oxygen, and the oxygen has a concentration of about vol.%, wherein the membrane separation device comprises at least one of a hollow fiber module, wherein the gas flow is cleaned of at least particles (using filter 100) and heated to about 95 ^{0}F before entering the membrane separation unit, wherein the separation of the gas in the membrane separation unit is performed at ambient temperature, and wherein the pressure of the inlet pressure of the gas flow, the outlet pressure of the retentate and the outlet pressure of the permeate are changed in the single stage in Fig. 1 and col. 2, line 50 to col. 5, line 19.

10. Claims 62-65 and 68 are rejected under 35 U.S.C. 102(b) as being anticipated by Yee et al. (US 5,447,555).

Yee et al. discloses a membrane separation system for enrichment of at least one gas component in a gas flow comprising a membrane separation unit having at least one membrane separation device (113) with at least one membrane (115) for

enriching a component of a gas flow to the membrane separation unit by separating the gas flow into a retentate which is discharged on a retentate side of the membrane, and a permeate which is discharged on a permeate side of the membrane, and a vacuum compressor (121) for lowering the pressure level on the permeate side of the membrane, wherein at least one pressure compressor (103) is provided for increasing the inlet pressure of the gas flow upstream of the membrane separation unit, wherein at least one heat exchanger is provided for changing the temperature of the gas flow upstream of the membrane separation unit, wherein the at least one membrane separation device comprises at least one plate module, wherein the system further comprises a plurality of different membrane separation units, each of which has at least one membrane separation device with at least one membrane for enriching a component of the gas flow fed to the membrane separation unit be separating the gas flow into a retentate which is discharged on a retentate side of the membrane, and a permeate which is discharged on a permeate side of the membrane, and a vacuum compressor (121) for lowering the pressure level on the permeate side of the membrane in Figs. 1-5 and col. 3, line 59 to col. 11, line 23.

11. Claims 62, 63 and 65 are rejected under 35 U.S.C. 102(e) as being anticipated by Nelson et al. (US 6,540,813 B2).

Nelson et al. discloses a membrane separation system for enrichment of at least one gas component in a gas flow comprising a membrane separation unit having at least one membrane separation device (30) with at least one membrane (10) for

enriching a component of a gas flow to the membrane separation unit by separating the gas flow into a retentate which is discharged on a retentate side of the membrane, and a permeate which is discharged on a permeate side of the membrane, and a vacuum compressor for lowering the pressure level on the permeate side of the membrane, wherein at least one pressure compressor is provided for increasing the inlet pressure of the gas flow upstream of the membrane separation unit, wherein the at least one membrane separation device comprises at least one of a hollow fiber module and a plate module in Figs. 1-5 and col. 4, line 24 to col. 14, line 30.

12. Claims 62 and 64-66 are rejected under 35 U.S.C. 102(b) as being anticipated by Blackmer et al. (US 3,976,451).

Blackmer et al. discloses a membrane separation system for enrichment of at least one gas component in a gas flow comprising a membrane separation unit having at least one membrane separation device (10) with at least one membrane (60) for enriching a component of a gas flow to the membrane separation unit by separating the gas flow into a retentate which is discharged on a retentate side of the membrane, and a permeate which is discharged on a permeate side of the membrane, and a vacuum compressor for lowering the pressure level on the permeate side of the membrane, wherein the at least one membrane separation device comprises at least one hollow fiber module, and further comprising a filter (100) for removing at least particles from the gas flow upstream of the membrane separation unit in Fig. 1 and col. 2, line 50 to col. 5, line 19.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yee et al. (US 5,447,555) or Nelson et al. (US 6,540,813 B2).

Yee et al. and Nelson et al. do no explicitly teach the absolute pressure of the gas flow delivered to the membrane separation unit being 1.5 bar or the retentate being discharged at an absolute pressure of approximately 1 bar, but one of ordinary skill in the art at the time the invention was made would have recognized that the operating pressures of the Yee et al. and Nelson et al. methods could be slightly adjusted as needed to provide a desired flow rate of permeate concentration, as is well known in the art.

15. Claim 34, 37 and 42 rejected under 35 U.S.C. 103(a) as being unpatentable over Yee et al. (US 5,447,555) or Nelson et al. (US 6,540,813 B2) in view of Blackmer et al. (US 3,976,451).

With regard to claims 34 and 37, Yee et al. and Nelson et al. do not explicitly teach the volume of the permeate stream or the concentration of the component of the gas flow that is enriched being controlled by lowering the pressure level on the permeate side, but Blackmer et al. teaches the volume of the permeate stream or the concentration of the component of the gas flow that is enriched being controlled by the vacuum applied to the permeate side in col. 4, lines 34-39.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the vacuum control of Blackmer et al. into the methods of Yee et al. and Nelson et al. to provide a desired volume of the permeate stream or a concentration of the permeate component, as suggested by Blackmer et al. in col. 4, lines 34-39.

Additionally, the pressure difference between the gas flow and the retentate is controlled depending on the concentration of the component enriched in the permeate since the flow rate (and hence pressure drop) on the retentate side of the membrane and the concentration of the enriched component in the permeate are dependent on the level of vacuum on the permeate side.

With regard to claim 42, Yee et al. and Nelson et al. do not teach cleaning the gas flow before it enters the membrane separation unit, but Blackmer et al. teaches using a filter (100) to clean the gas flow of at least particles prior to entering the membrane separation unit in Fig. 1 and col. 5, lines 3-8.

16. Claims 44 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yee et al. (US 5,447,555) or Nelson et al. (US 6,540,813 B2) and Blackmer et al. (US 3,976,451), respectively, in view of European Patent Application Publication EP 0 362 436 A1.

Yee et al., Nelson et al. and Blackmer et al. do not teach removing condensable parts from the gas flow before entering the membrane separation unit, but EP 0 362 436 A1 teaches removing (at 28) condensable parts (water) from the gas flow before entering a membrane separation un it in Fig. 2 and col. 8, lines 4-27.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the condensable parts separator of EP 0 362 436 A1 into the methods of Yee et al., Nelson et al. and Blackmer et al. to prevent water vapor from passing through the membrane into the permeate, as suggested by EP 0 632 436 A1 in col. 4, lines 4-27 and as is well known in the art.

17. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blackmer et al. (US 3,976,451) in view of Yee et al. (US 5,447,555).

Blackmer et al. does not teach the process comprising a plurality of membrane separation devices arranged in parallel, but Yee et al. teaches using such an arrangement to allow each membrane separation device to operate with an independent feed side to permeate side pressure ratio in col. 3, line 59 to col. 4, line 34.

18. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yee et al. (US 5,447,555) or Nelson et al. (US 6,540,813 B2) in view Blackmer et al. (US 3,976,451).

Yee et al. and Nelson et al. do not disclose the system of claim 63 comprising a mobile unit having a transportable case, but Blackmer et al. teaches a similar system having a mobile and transportable case in Fig. 1 and col. 1, lines 53-57.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the mobile unit having a transportable case of Blackmer et al. into the systems of Yee et al. and Nelson et al. to allow the system be transported for use at different locations, as suggested by Blackmer et al. in col. 1, lines 53-57.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the systems of Yee et al. and Nelson et al. portable in that such is merely a choice of design. See In re Lindberg, 93 USPQ 23.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Henry and Callaghan et al. references disclose similar systems.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (571) 272-1157. The examiner can normally be reached on Monday - Friday (9:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Primary Examiner
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/Jason M. Greene/
2/1/08

jmg
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